

REMARKS

The Office Action of April 9, 2008, and the references cited therein have been carefully considered.

In this response, the specification has been amended to provide section headings, and the claims have been amended only to correct noted informalities and to more specifically define the claimed bus bar. In addition, FIGS. 1 and 2 have been amended to provide the proper cross-hatching for the various elements, and FIG. 1 has been labeled as "PRIOR ART" as required by the Examiner.

As indicated above, the drawings have been amended to provide the proper cross-hatching for the metal parts, and FIG. 1 has been labeled as "PRIOR ART," all as required by the Examiner. Accordingly, it is submitted that the objections to the drawings have been overcome, and it is requested that the Examiner acknowledge receipt and approval of the replacement drawings in the next Office Action.

The rejection of claims 1-3 under 35 U.S.C. §103(a) as being unpatentable over Steigerwalt et al. (U.S. 2,912,745) has been noted and is respectfully traversed. In order to even more specifically define the invention, claim 1 has been amended to more specifically define the bus bar to which the present invention pertains. That is, claim 1 has been amended to specifically recite that the bus bar is made entirely of a good electrical and heat-conducting material. Additionally, new claims 4 and 5, dependent on claim 1, have been added to specifically recite that the bus bar consists of a metal, with claim 5 specifically reciting that the metal is copper, a copper alloy, or silver.

Contrary to the assertion in the Office Action, the patent to Steigerwalt does not disclose any bus bar, as this term is commonly used in the art, but rather only discloses a printed circuit including a thin metal foil 9, which is shaped into a conductor 2, disposed on a base formed of a plurality of sheets 7 of fiber impregnated with uncured plastic. Such an arrangement not only is not a bus bar, but also clearly is not a bus bar formed entirely of a good electric and heat-conducting material as required by claim 1. Moreover, claim 1 specifically requires that the bus bar has a conical bore formed

therein. Again, no such conical bore is found in the Steigerwalt arrangement wherein, as stated in the Steigerwalt patent, the foil is shaped to provide a conically shaped depression. The only thing that can be considered to be a conically shaped bore is formed in the plastic base material 7 and not in a conductive portion. Accordingly, for the above-stated reasons, claim 1, and claims 2 and 3 dependent thereon, are allowable over the Steigerwalt patent.

It is further submitted that in spite of the general similarities in appearance between the present invention and the arrangement of Steigerwalt, the different heat conductivities involved provide a basic difference between the presently claimed invention and that of Steigerwalt. Note that the plastic base plate of Steigerwalt is neither heat- nor electrically conducting and, therefore, address different problems and has different heat conductivity considerations from the present invention. With use of the conical design of the bore or depression in the presently claimed invention and Steigerwalt, an increased surface area is provided and a larger amount of the soldering material is used for the soldering as compared to the use of only cylindrical bores or cylindrical holes in a circuit board. A higher volume of heated soldering material causes problems in arrangement such as Steigerwalt, since the higher amount of heat is led away, because the contacting surrounding medium is plastic, which has a minimum heat conductivity. With an increased mass of heated soldering material, the lead out terminal of the semiconductor device will be exposed to the undesired high temperature over a longer period of time than is the case with the cylindrical design where a smaller volume of heated soldering material is utilized. Due to this fact, the likelihood of the semiconductor being damaged by the persistently prevailing heat would be higher in the case of a conical design where the surrounding material does not have good heat-conducting properties.

On the other hand, the problem which occurs when trying to solder to a bus bar made of a good electrical and heat-conducting material would not even appear in the case of a substrate made of plastic material, since the problem in using the conventional cylindrical bore lies in that high heat conductivity of the bus bar leads the

heat away from the soldering portion, and one cannot be certain that the temperature conditions required for a high quality soldering are established in the interior of the gap between the cylindrical lead out terminal of the semiconductor device and the cylindrical bore. Even if established, it is not possible to check this fact by visual inspection; and, if more heat is applied, the semiconductor device can be damaged.

The present invention thus makes sense only when the bus bar has a high heat conductivity and quickly leads the heat away. However, due to the large upper surface of the conical bore, the applied heat is sufficient for the bar and the lead-out terminal to reach the required temperature. Moreover, the form of the solidified soldering material, i.e., the surface shape, shows whether the soldering is perfect or defective. At the same time, the high heat conductivity will first cool down the lower narrow end of the bore where the semiconductor terminal is inserted; therefore, the terminal will be cooled just at the position where excess heat should be reduced in time and temperature. Thus, the high heat conductivity of the bus bar according to the presently claimed invention provides just the opposite conditions regarding the heating and cooling as occurred in the case of a substrate made of a plastic material as in the Steigerwalt patent. Due to the different heat and cooling effects present in the Steigerwalt patent arrangement, one skilled in the art with knowledge of Steigerwalt would not find it obvious to apply a similarly lacking in design in case of a metal bus bar as it is not apparent that in bus bars, the opposite consequences would take place from Steigerwalt.

Accordingly, for these reasons, it is submitted that claim 1, and claims 2 and 3 dependent thereon, are allowable over the Steigerwalt patent under 35 U.S.C. §103(a). Newly presented claims 4 and 5, dependent on claim 1, are, therefore, allowable over the Steigerwalt patent for at least the same reasons as that claim. Moreover, claim 4 specifically recites that the bus bar consists of metal, while claim 5, which is dependent on claim 4, specifically recites that the metal is copper, a copper alloy, or a silver. Clearly, these limitations are not disclosed or made obvious by the Steigerwalt patent.

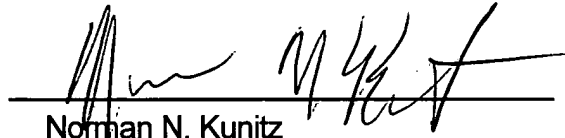
In view of the above amendments and for the above-stated reasons, it is submitted that all of the pending claims, i.e., claims 1-5, are allowable over the art of record and are in condition for allowance. Such action and the passage of this application to issue, therefore, are respectfully requested.

The Examiner is of the opinion that prosecution of this application would be advanced by a personal interview, he is invited to telephone undersigned counsel to arrange for such an interview.

Respectfully submitted,

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